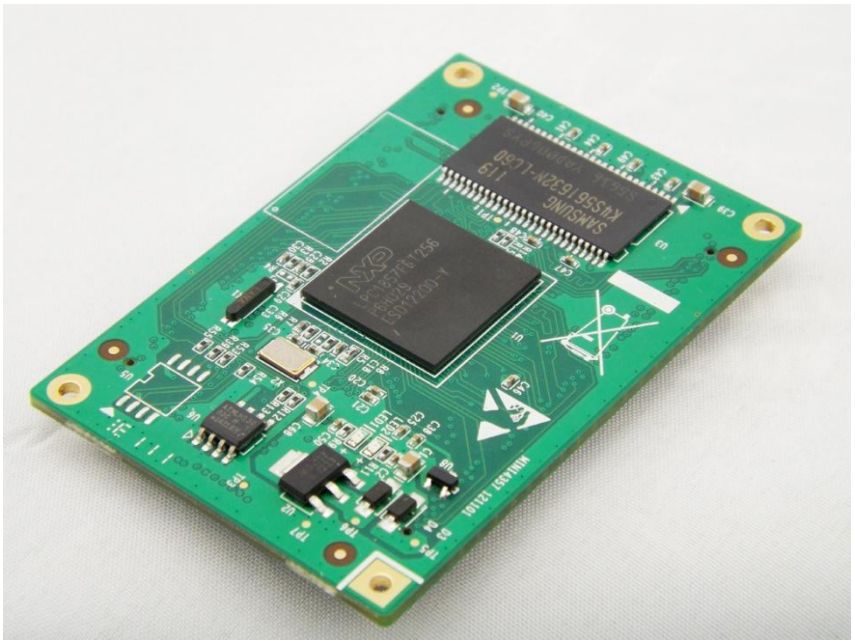
MINI1857

Core board



User Manual

Version 1.1

14th Jan 2014

mbest
A Premier Farnell Company

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1 Product Overview

1.1 Introduction

The MINI1857 is an embedded core module built on LPC1857FET256 - a 32bit ARM Cortex-M3 microcontroller. By combining the MINI1857 with an expansion board from Embest (EDM1070xx or EDM1043xx) or other specifically designed boards built according to the hardware interfaces of the MINI1857, users can implement a quick function trimming so as to create a shorter time to market.

1.2 Kit Contents

- ✓ MINI1857 Core Board
- ✓ CD-ROM
- ✓ Four hex head cap screws
- ✓ Four brass tube plugs
- ✓ **Optional**
    - EDM1070B-01
    - EDM1070BR-01 (with 4 wire resistive touchscreen)
    - EDM1043B-01
    - EDM1043BR-01 (with 4 wire resistive touchscreen)

1.3 Board Interfaces

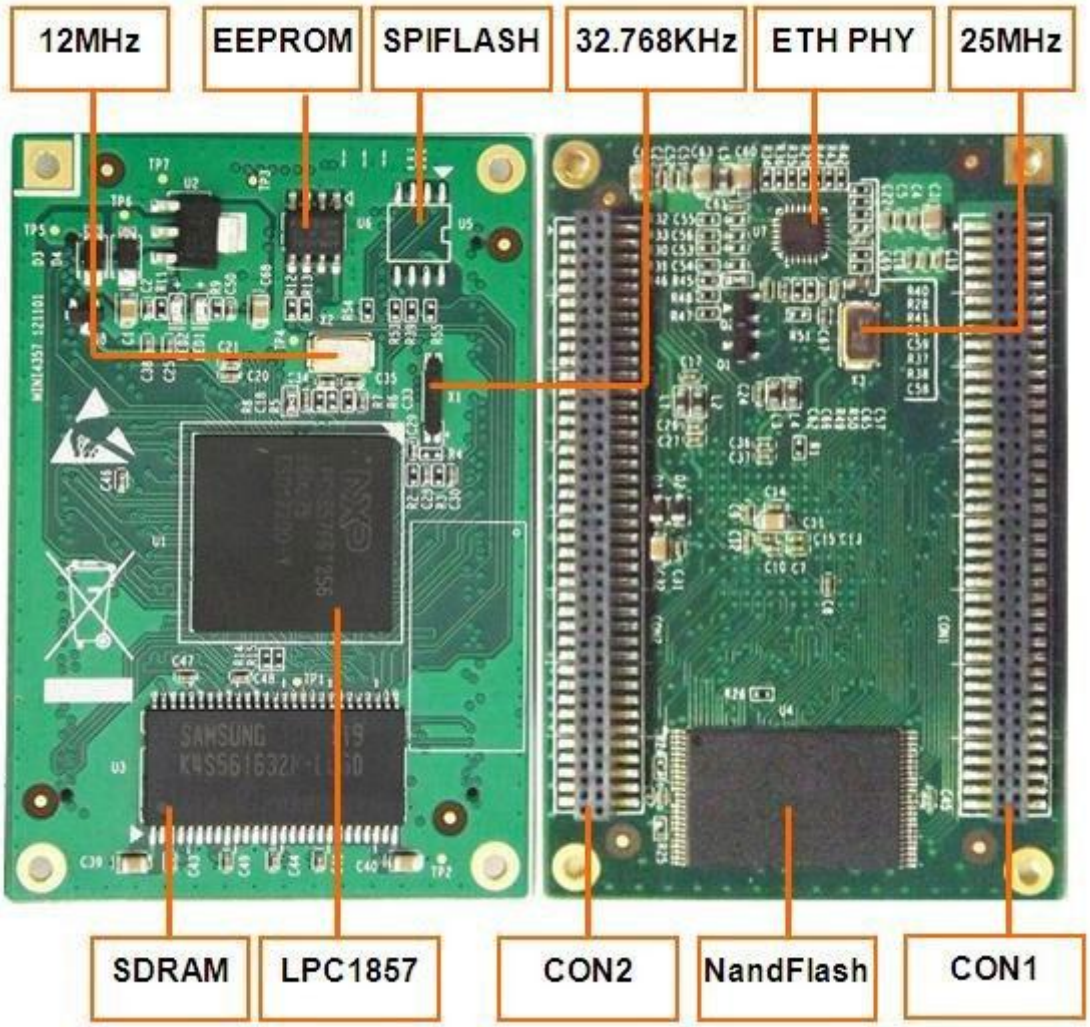

Figure 1: MINI1857 Board Interfaces

1.4 System Block Diagram

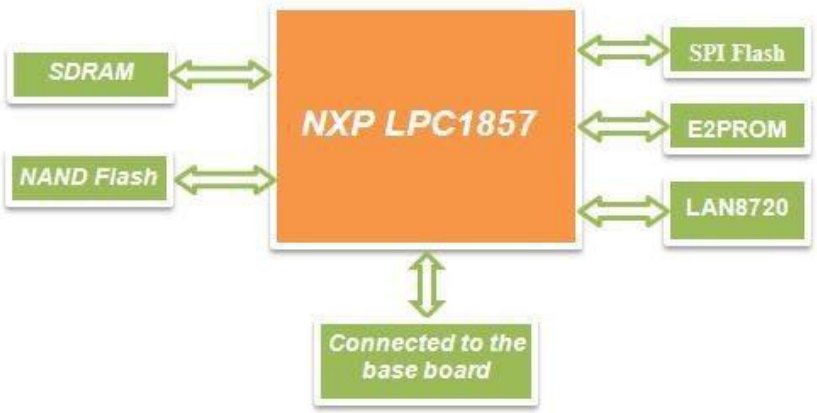

Figure 2: MINI1857 System Block Diagram

1.5 Physical Dimensions

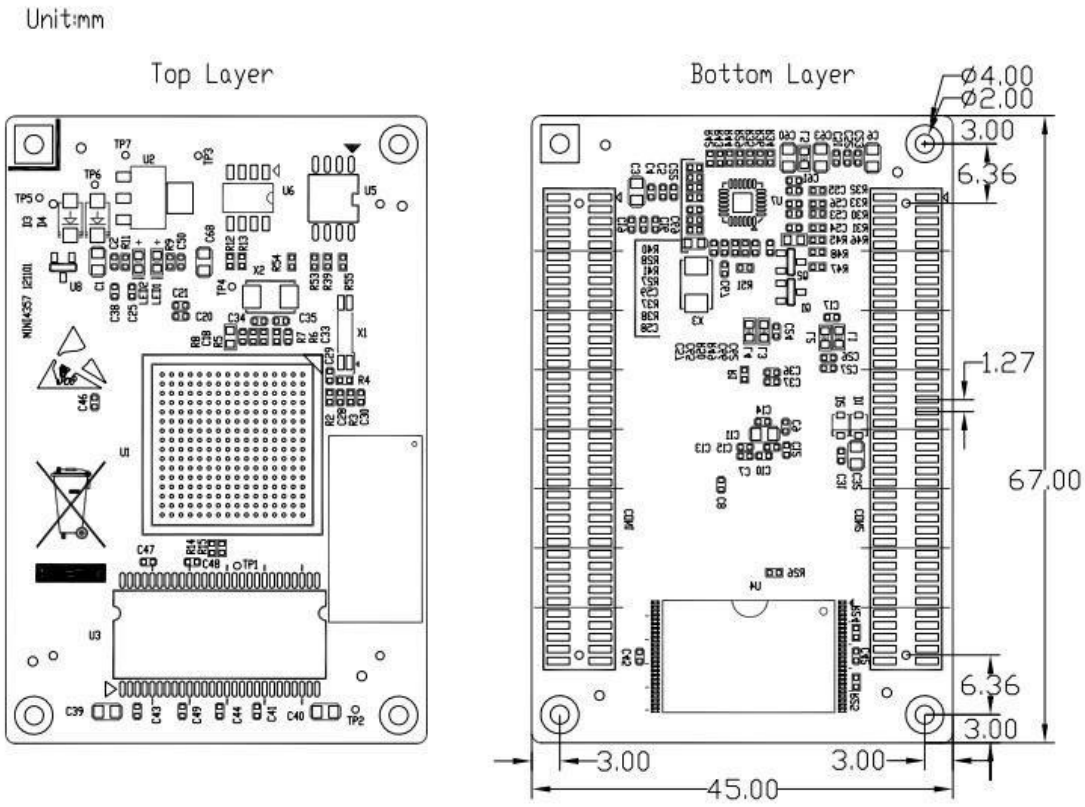

Figure 3: MINI1857 Physical Dimensions

2 Hardware Features

2.1 Processor

- NXP LPC1857FET256 microcontroller based on 32-bit ARM Cortex-M3, operating at up to 180MHz
- Floating-point unit
- 1024KB Flash
- 136 KB SRAM
- 16KB EEPROM
- LCD controller with support for 24bpp true-colour mode and a resolution of up to 1024×768
- USB 2.0 high-speed Host/Device/OTG interface with on-chip PHY and support for DMA transmission
- USB 2.0 high-speed Host/Device interface with on-chip PHY and ULPI which supports external high-speed PHY
- 10/100 Mbps Ethernet MAC MII/RMII interface
- Four-wire SPI flash interface (SPIFI) with data transfer rate of up to 40Mbps per channel
- Two CAN 2.0B
- Four UARTs
- Two I2S'
- Two I2Cs
- Two SSPs
- SPI bus
- Four 32-bit general purpose timers
- Two standard PWMs
- Motor control PWM with Quadrature encoder interface
- Two 10-bit ADCs operating at up to 400KHz

- 10-bit DAC operating at up to 400KHz
- 164 general-purpose I/O interfaces
- Two watchdog timers

2.2 On-Board Memory

- 128MB NAND Flash
- 32MB SDRAM
- 2KB EEPROM
- 4MB SPI Flash (spare solder pads)

2.3 Communication Interfaces

- Two SPI interfaces
- Three 3-wire UART interfaces
- Touch-screen interface (16-bit 256RGB)
- I2C interface
- I2S interface
- Two USB interfaces
- Two CAN interfaces
- SDIO interface
- 10/100Mbps Ethernet interface

2.4 Operational Parameters

- Operating Temperature: 0°C ~ 70°C
- Storage Temperature: -40°C ~ 85°C
- Operating Humidity: 0% ~ 90% (Non-condensing)
- Power Supply: 5V @ 0.8A, DC
- PCB Layers: 6
- Top Layer Component Height $_{MAX}$ = 2 mm

- Bottom Layer Component Height $_{MAX}$ = 5 mm
- Board Thickness =1.6mm

3 Software Features

3.1 System Features

Supports:

- uC/OS-II_v2.91 operating system
- emWin5.18 graphic interface
- FatFs_vR0.08a filesystem
- LWIP _v1.4.0 protocol stack

3.2 Development Environments

- IAR EWARM Integrated Development Environment

All drivers can work with IAR EWARM V6.40 or higher;

- Keil MDK-ARM Integrated Development Environment

All drivers and applications can work with Keil MDK-ARM V4.60 or higher.

3.3 Debugging Tools

- ULINK2

ULINK2 is recommended to be used under Keil MDK-ARM for the best debugging performance;

- JLINK-V9.1

JLINK-V9.1 is recommended to be used under IAR EWARM for the best debugging performance

4 Hardware Details

4.1 Interfaces

4.1.1 CON1 Interface

Pin	Name	Function
1	VDD5V	+5V power
2	VDD5V	+5V power
3	VBAT_IN	VBAT In
4	GND	GND
5	TDI	Test data input
6	nTRST	Test system reset
7	TCK	Test clock
8	TMS	Test mode select
9	nRESET	Test system reset
10	TDO	Test data output
11	P1_4	GPIO
12	PC_2	GPIO
13	PC_3	GPIO
14	PC_9	GPIO
15	PC_11	GPIO
16	PC_12	GPIO
17	PC_13	GPIO
18	PC_14	GPIO
19	SD_DAT2	GPIO
20	SD_DAT3	GPIO

Pin	Name	Function
21	SD_CMD	GPIO
22	GND	GND
23	SD_DAT0	Card data 0
24	SD_CLK	Card Clock
25	SD_DAT1	Card data 1
26	SD_CD	Card Command Signal
27	PD_0	GPIO
28	PD_1	GPIO
29	PD_2	GPIO
30	PD_3	GPIO
31	PD_4	GPIO
32	PD_5	GPIO
33	PD_6	GPIO
34	PD_7	GPIO
35	PD_8	GPIO
36	PD_9	GPIO
37	PD_10	GPIO
38	PD_11	GPIO
39	PD_12	GPIO
40	PD_13	GPIO
41	SPIFI_SIO2	SPIFI Data 2
42	P9_0	GPIO
43	P9_1	GPIO
44	P9_2	GPIO

Pin	Name	Function
45	P9_3	GPIO
46	P9_4	GPIO
47	USB_PWR_FAULT	USB power fail
48	USB1_PWR_EN	USB1 power enable
49	USB1_DM	USB1 bidirectional D+ line
50	USB0_PWR_EN	USB0power enable
51	USB1_DP	USB0 bidirectional D-line
52	P3_0	GPIO
53	USB0_PWR_FAULT	USB0 power fail
54	USB1_VBUS	VBUS drive signal
55	GND	GND
56	I2C_SCL	I2C clock input/output
57	U1_TXD	UART1Transit data
58	I2C_SDA	I2C data input/output
59	U1_RXD	UART1 Receive data
60	U3_TXD	UART3 Transit data
61	U1_TDR	Data Terminal Ready
62	U3_RXD	UART3 Receive data
63	U0_TXD	UART0 Transit data
64	EMC_A9	EMC address line 9
65	U0_RXD	UART0 Receive data
66	U2_TXD	UART2 Transit data
67	CAN0_TD	C_CAN transmit output
68	U2_RXD	UART2 Receive data

Pin	Name	Function
69	CAN0_RD	C_CAN receive input
70	CAN1_TD	C_CAN transmit output
71	PE_2	GPIO
72	CAN1_RD	C_CAN receive input
73	PE_4	GPIO
74	PE_3	GPIO
75	PE_6	GPIO
76	PE_5	GPIO
77	PE_8	GPIO
78	PE_7	GPIO
79	PE_14	GPIO
80	PE_9	GPIO

4.1.2 CON2 Interface

Pin	Name	Function
1	LED1_LINK/ACK	LINK LED
2	ENET_TXN	Ethernet Transmit Data
3	LED2_SPEED	SPEED LED
4	ENET_TXP	Ethernet Transmit Data
5	USB0_ID	USB0 ID pin
6	ENET_RXN	Ethernet Receive Data
7	USB0_VBUS	VBUS pin
8	ENET_RXP	Ethernet Receive Data
9	GND	GND
10	GND	GND

Pin	Name	Function
11	USB0_DM	USB0 bidirectional D□- line
12	P4_3	GPIO
13	USB0_DP	USB0 bidirectional D+ line
14	P4_0	GPIO
15	P4_1	GPIO
16	P4_4	GPIO
17	P8_0	GPIO
18	P8_1	GPIO
19	P8_2	GPIO
20	P8_8	GPIO
21	LCD_HSYNC	Horizontal Sync Input
22	LCD_BL_EN	LCD backlight
23	LCD_VSYNC	Vertical Sync Input
24	LCD_DCLK	Sample clock
25	LCD_PWR	LCD power enable
26	GND	GND
27	LCD_VD4	LCD panel data4
28	LCD_DE	Data Input Enable
29	LCD_VD6	LCD panel data6
30	LCD_VD3	LCD panel data3
31	LCD_VD11	LCD panel data11
32	LCD_VD5	LCD panel data5
33	LCD_VD13	LCD panel data13
34	LCD_VD7	LCD panel data7

Pin	Name	Function
35	LCD_VD15	LCD panel data15
36	LCD_VD10	LCD panel data10
37	LCD_VD20	LCD panel data20
38	LCD_VD12	LCD panel data12
39	LCD_VD22	LCD panel data22
40	LCD_VD14	LCD panel data14
41	LCD_VD23	LCD panel data23
42	LCD_VD19	LCD panel data19
43	GND	GND
44	LCD_VD21	LCD panel data21
45	ADC0	ADC input channel 0
46	ADC1	ADC input channel 1
47	ADC2	ADC input channel 2
48	ADC3	ADC input channel 3
49	ADC4	ADC input channel 4
50	ADC5	ADC input channel 5
51	ADC6	ADC input channel 6
52	ADC7	ADC input channel 7
53	WAKEUP0	Wakeup pin 0
54	WAKEUP1	Wakeup pin1
55	WAKEUP2	Wakeup pin 2
56	WAKEUP3	Wakeup pin 3
57	SPIFI_SCK	Serial clock for SPI/SSP0/SPIFI
58	SPIFI_SC	Slave Select for

Pin	Name	Function
		SPI/SSP0/SPIFI
59	SPIFI_MISO	Master In Slave Out for SPI/SSP0/SPIFI
60	SPIFI_MOSI	Master Out Slave In for SPI/SSP0/SPIFI
61	GND	GND
62	SSP0_SSEL	Slave Select for SSP0
63	SSP0_SCK	Serial clock for SSP0
64	SSP0_MOSI	Master Out Slave In for SSP0
65	SSP0_MISO	Master In Slave Out for SSP0
66	TP_PENIRQ	LCD Touch IRQ
67	TP_BUSY	LCD Touch busy
68	PF_9	GPIO
69	P6_1	GPIO
70	P6_0	GPIO
71	P6_7	GPIO
72	P6_2	GPIO
73	SPIFI_SIO3	SPIFI Data 3
74	GND	GPIO
75	P7_2	GPIO
76	CLK1	Clock output pin 1
77	P7_4	GPIO
78	CLK2	Clock output pin 2
79	P7_5	GPIO
80	CLK3	Clock output pin 3

4.1.3 SPI Flash Interface

Pin	Name	Function
1	SSP1_SSEL	Slave Select for SSP1
2	SSP1_MISO	Master In Slave Out for SSP1
3	VDD3V3（WP）	+3.3V power
4	GND	GND
5	SSPI1_MOSI	Master Out Slave In for SSP1
6	SSP1_SCK	Serial clock for SSP1
7	P7_3（HOLD）	GPIO
8	VDD3V3	+3.3V power

Appendix 1: ESD Precautions & Handling Procedures

Please note that the board comes without any case/box and all components are exposed. Therefore, extra attention must be paid to ESD (electrostatic discharge) precautions. To effectively prevent electrostatic damage, please follow the steps below:

- Avoid carpets in cool, dry areas. Leave development kits in their anti-static packaging until ready to be installed.
- Dissipate static electricity before handling any system components (development kits) by touching a grounded metal object, such as the system unit unpainted metal chassis.
- If possible, use antistatic devices, such as wrist straps and floor mats.
- Always hold an evaluation board by its edges. Avoid touching the contacts and components on the board.
- Take care when connecting or disconnecting cables. A damaged cable can cause a short in the electrical circuit.
- Prevent damage to the connectors by aligning connector pins before you connect the cable. Misaligned connector pins can cause damage to system components at power-on.
- When disconnecting a cable, always pull on the cable connector or strain-relief loop, not on the cable itself.

Warning:

🕮 This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Appendix 2: Technical support & Warranty

Embest Technology Co., Ltd. established in March of 2000, is a global provider of embedded hardware and software. Embest aims to help customers reduce time to market with improved quality by providing the most effective total solutions for the embedded industry. In the rapidly growing market of high end embedded systems, Embest provides comprehensive services to specify, develop and produce products and help customers to implement innovative technology and product features. Progressing from prototyping to the final product within a short time frame and thus shortening the time to market, and to achieve the lowest production costs possible. Embest insists on a simple business model: to offer customers high-performance, low-cost products with the best quality and service.

2.1 Technical support service

Embest provides one year of free technical support for all products. The technical support service covers:

- Embest embedded platform products software/hardware materials
- Assistance to customers with regards to compiling and running the source code we offer.
- Troubleshooting problems occurring on embedded software/hardware platforms if users have followed the instructions provided.
- Judge whether a product failure exists.

The situations listed below are not covered by our free technical support service, and Embest will handle the situation at our discretion:

- Customers encounter issues related to software or hardware during their development process

- Issues occur when users compile/run the embedded OS which has been modified by themselves.
- Customers encounter issues related to their own applications.
- Customers experience problems caused by unauthorised alteration of our software source code

2.2 Maintenance service clause

1. Product warranty will commence on the day of sale and last 12 months provided the product is used under normal conditions
2. The following situations are not covered by the warranty, Embest will charge service fees as appropriate:

- Customers fail to provide valid proof of purchase or the product identification tag is damaged, unreadable, altered or inconsistent with the product.
- Products are subject to damage caused by operations inconsistent with their specification;
- Products are subject to damage in either appearance or function due to natural disasters (flood, fire, earthquake, lightning strike or typhoon) or natural aging of components or other force majeure;
- Products are subject to damage in appearance or function due to power failure, external forces, water, animals or foreign materials;
- Products malfunction due to disassembly or alteration of components by customers, or repair by persons or organizations unauthorized by Embest Technology, or alteration from factory specifications, or configured or expanded with components that are not provided or recognized by Embest Technology;
- Product failures due to the software or systems installed by customers, inappropriate software settings or computer viruses;
- Products purchased from unauthorized merchants;

- Embest Technology takes no responsibility for fulfilling any warranty (verbal or written) that is not made by Embest Technology and not included in the scope of our warranty.

3. Within the period of warranty, the cost for sending products to Embest should be paid by the customer. The cost for returning the product to the customer will be paid by Embest. Any returns in either direction occurring after the warranty period has expired should be paid for by the customer.

4. Please contact technical support with any repair requests.

Note:

📖 Embest Technology will not take any responsibility for products returned without the prior permission of the company.

2.3 Basic guidelines for protection and maintenance of LCDs

1. Do not use finger nails or other hard sharp objects to touch the surface of the LCD

2. Embest recommends purchasing specialist wipes to clean the LCD after long time use, avoid cleaning the surface with fingers or hands as this may leave fingerprints or smudges.

3. Do not clean the surface of the screen with unsuitable chemicals

Note:

📖 Embest do not supply a maintenance service for LCDs. We suggest the customer immediately checks the LCD once in receipt of the goods. In the event that the LCD does not run or shows no display, the customer should inform Embest within 7 business days of delivery.

2.4 Value Added Services

We will provide following value added services:

- Driver development based on Embest embedded platforms for devices such as: serial ports, USB interface devices, and LCD screens.
- Control system transplantation, BSP driver development, API software development.
- Other value added services including supply of power adapters and LCD parts.
- Other OEM/ODM services.
- Technical training.

Please contact Embest with any technical support queries:

http://www.embest-tech.com/contact-us.html